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Effect of Electrolytes on the

Absorption of Direct Dyestuffs

by Cellulose

By A. M. PATEL

THOUGH the substantive dyeing of cotton by direct dyestuffs has been practiced for a long time, their action on the fibers has been very vaguely understood, in spite of much experimental work in order to explain the processes and their mechanism. The absence of any idea on the mechanism of dyeing is not due to the lack of skill on the part of those investigators who tackled the problem, but to the fact that the whole system of dyeing is very complex. One has to take into account the nature of the dyestuffs and the different changes which they undergo in presence of various substances. Any explanation put forward for the interpretation of the mechanism of dyeing should explain the following facts in the case of substantive dyeing:

1. The absence of any dyeing property of the majority of the substantive dyestuffs in the absence of the sulfate or chloride of sodium.
2. The effect of the addition of various electrolytes on the amount of the dye absorbed.
3. The poor fastness to washing that is exhibited by almost all the substantive dyestuffs.

Properties of Direct Dyestuffs

The substantive dyestuffs have very high molecular weights and it is, therefore, quite natural that in aqueous solutions they exist in the form of colloidal electrolytes (cf., McBain, J.A.C.S. *55*, 545, 1933; also Hartley and Robinson, P.R.S. 134 A, 20 1931). During the dialysis of the dye-colloid, one should take into account the fact that in presence of colloidally dispersed substances, the dialysis of the truly dissolved materials may be hindered if their molecules are strongly adsorbed by the micelles of the colloid. Freundlich has divided the dyes into true, semi-colloidal and colloidal, depending upon the nature of their aqueous solutions. Benzo-purpurin 4B, C. I. 488, and Congo Red, C. I. 370, are the classical examples of true colloidal electrolytes, whereas Chlorazol Sky-Blue FF, C. I. 518, is semi-colloidal in nature. It is found that the colloidal nature depends upon the number of the carbon atoms and the polar groups present in the dyestuff molecules. The position of the radicals also plays an important part in conferring colloidality on the direct dyestuffs. Thus it is found that Benzo-purpurin 4B, which contains two sulfonic acid groups, is more colloidal than the product in which the methyl radical occupies the meta position (cf. Robinson and Mills, P.R.S. 131 A, 576, 1931). On the other hand, Chlorazol Sky-Blue FF, whose molecular weight is 992 and which contains thirty-four carbon atoms but four sulfonic acid groups, is far less colloidal than Benzo-purpurin 4B whose molecular weight is 724 and which contains the same number of carbon atoms but only two sulfonic acid radicals. It will thus be seen that the constitution of the dyestuffs is closely connected with their colloidality and the latter is directly connected with the amount of the dye absorbed by cellulose and its various modifications. In agreement with the above statement, it is found by the author that Benzo-purpurin 4B, which is far more colloidal in nature, is absorbed to a far greater extent than Sky-Blue FF. It should also be pointed out that the constitution of the dyestuffs is closely related to their solubility and it can be stated that, generally, the greater the solubility of a color, the less is its absorption by the fiber. Griffiths and Neale (Trans. Faraday Soc. 30, 395, 1934), from their work on a number of dyestuffs, came to the conclusion that substantivity was inversely related to solubility. This is another way of saving that the greater the colloidality of a dye the greater is its absorption. The relation between the absorption and the col-

loidal character of the direct dyestuffs will be more fully discussed later on.

The dye solution has, in many cases, a complex character as products of association, ionization and hydrolysis may be existing together in a state of equilibrium. With solutions of the mono-sulfonates on the direct colors, the association and hydrolysis products are the most important and the molecular weight calculated by the physical methods, such as osmotic pressure, is much higher than the theoretical value. With the disulfonates their molecular weights determined by the same methods, agree on the whole with those calculated from their chemical formulae. This may be due to the fact that in such cases, the ionization practically balances association. With the increase of the number of the sulfonic acid group in the dye molecule, the question of ionization becomes of primary importance, and owing to the extent to which this takes place, the observed values for the molecular weights are considerably smaller than the theoretical ones.

Purification of the Direct Dyes

Various methods have been suggested for the purification of the direct colors which always contain inorganic and organic impurities. It should be emphasized that the purity of the color is of paramount importance in the quantitative work. The disagreement in the coagulation values is due to the fact that different investigators used dyes of various degrees of purity. It is impossible to arrive at any sound generalization from the results obtained by utilizing dyestuffs of doubtful purity. Their purification is very difficult on account of their complex nature and also due to the fact that some may contain their isomerides and homologues, which are very difficult to separate from the mixture. Even a slight trace of an inorganic impurity will greatly affect the behavior of those dyes which are highly colloidal in nature, as, for example, Benzo-purpurin 4B. In fact, many times the difficulty which is encountered in preparing a clear solution of these dyes by dissolving them in water is to be ascribed to the existence of slight amounts of electrolytes which are present if extreme care is not taken to remove them, and which decrease the solubility of the dyes by either salting them out or by the formation of an insoluble salt.

It is not intended to review all the methods which have been suggested from time to time for the purification of the dyes. However, it should be mentioned that the method recently worked out by Robinson and Mills (Loc. cit.) is found to be very useful by the author, who purified a number of direct dyestuffs and compared their purity with some of the chemically pure samples supplied by the I. G. Farbenindustrie A. G. The dye was dissolved in boiling water and then filtered in order to remove the undissolved dye particles and the insoluble impurities. The solution was then salted out by adding a saturated solution of sodium acetate preceded by the addition of alcohol. The precipitate was then filtered and washed with 50% aqueous alcohol three or four times. This process was repeated four times and finally the dye was crystallized three times from 50% aqueous solution of alcohol. The purified dyestuff was finally dried at 110° C. in an oven. Care was taken to see that the temperature of the oven did not rise above 115° C. because it is found that some of the dyestuff gets decomposed at a higher temperature.

It was observed that by drying at 110° C. some of the dyes still contain some moisture. Thus it was found that Benzo-purpurin 4B contained about 1.6% of moisture, while Chlorazol Sky-Blue FF keeps up to 1.0% when dried at 110° C.

The dyes, moreover, were found to be hygroscopic at room temperature and therefore great precautions were taken while making the stock solution.

The purity of the dyes purified by the above method was estimated colorimetrically by comparing the purified dyestuffs with those supplied by the I. G. Farbenindustrie A. G. and assured to be chemically pure. It was found by this method that the color-value of Benzo-purpurin 4B was 6% higher than that of the sample supplied, whereas that of the purified Sky-Blue FF was the same as that of the sample.

It is not presumed that the samples supplied by the above-mentioned company were entirely pure, even though such an assumption can be justified, because the Sky-Blue FF, which was independently purified by the salting-out method by other investigators in the laboratory, had the same color value as that obtained in this work. Moreover, this method for the estimation of the purified dyestuffs, though relative, has an advantage that the purity of the dyes employed can be definitely stated and be of use to those who want to compare or reproduce the results under similar conditions.

As stated above, much of the work carried out on the study of the colloidal aspects of the substantive dyes is not reproducible and sometimes contradictory. This is due to the fact that in almost all the cases, the purity of the dye is not stated, even though relatively.

Table I

Comparison of the equilibrium absorption values and the diffusion coefficients of Benzo-purpurin 4B in presence of varying concentrations of various electrolytes.

N. B. In each column, the first value stands for the percentage equilibrium absorption, whereas the second represents the diffusion coefficient x 10^{+5}.

Concentrations of added electrolytes in normality.

Electrolytes	.00171 N	.00342 N	.02565 N	.0342 N	.04275 N	.0513 N	.0684 N	.171 N	.342 N
NaCl	.76, 1.10	.81, 2.6	2.1, 10.1	2.52, 11.0	2.95, 11.9	3.52, 10.9	4.53, 9.3	6.80, 7.7	10.33, 5.6
Na_2SO_4, $10H_2O$ ..	.67, .85	.72, 3.01	1.73, 15.2	2.30, 14.5	2.64, 12.7	....	3.67, 11.5	6.48, 9.4	9.41, 7.5
KCl	... ..	... ...	....	2.83, 9.6	....	....	4.83, 8.4	8.48, 7.3	12.70, 5.2

Table II

Comparison of the equilibrium absorption values and the diffusion coefficients of Sky-Blue FF in presence of varying concentrations of various electrolytes.

N. B. In each column, the first value stands for the percentage equilibrium absorption, whereas the second represents the diffusion coefficient x 10^{+8}.

Concentrations of added electrolytes in normality.

Electrolytes	.00855 N	.0171 N	.0342 N	.0855 N	0.171 N	0.342 N	0.513 N
NaCl	... ..	....	.31, 9.9	.73, 13.1	1.23, 12.9	1.88, 9.69	2.70, 6.34
Na_2SO_4, $10H_2O$	... ..	....	.... ..	.72, 12.8	....	....	....
NH_4Cl	... ..	....	.48, 9.1	.94, 13.1	1.44, 15.9	2.18, 9.9	2.84, 8.0
$(NH_4)_2SO_4$	... ..	....	.... ..	.93, 12.8	....	....	....
$MgCl_2$, $6H_2O$	.38, 10.3	.57, 11.7	.64, 13.1	1.06, 11.5	1.20, 10.2	1.45, 9.1	1.74, 7.3
$BaCl_2$, $2H_2O$	.93, 6.5	1.27, 7.14	2.22, 5.2	3.04, 4.13	....	....	....
$CaCl_2$, $6H_2O$	... ..	.72, 9.9	.93, 10.9	1.28, 8.9	1.70, 6.9	2.04, 6.2	2.40, 5.3
$ZnSO_4$, $7H_2O$	.43, 8.1	.57, 10.3	.76, 9.5	....	1.04, 8.5	1.43, 8.2	1.54, 7.9
$Al_2(SO_4)_3$, $18H_2O$	... ..	.26, 10.6	.44, 9.9	.61, 9.3	.65, 8.4	....	....
Na_2HPO_4, $12H_2O$	... ..	....	.24, 8.1	.53, 14.2	.86, 13.3	1.27, 13.1	....
KH_2PO_4	... ..	.20, 7.9	.47, 9.9	1.02, 11.2	1.66, 9.9	2.60, 9.6	....

It is well known that colloidal solutions are very sensitive to electrolyte impurities. If the purity of the dye used is not mentioned, there is every probability that coagulation values for different dyes will not be reproducible. Moreover, as pointed out by Hartley and Robinson (loc. cit.), the low values for the diffusion coefficient of the substantive dyes obtained by previous workers were due to the presence of electrolyte impurities.

Quantitative Estimation

The quantitative estimation of the dyestuffs from their aqueous solution has engaged the attention of the investigators in this branch of chemistry for a long time. Various methods have been devised as a result of much experimental work. However, it should be admitted that some methods are peculiar to certain classes of dyestuffs, while others, which are more general in nature, suffer from the disadvantage that they are either more or less inaccurate or relative. From a review of the existing literature, one can venture to say that an accurate and general method for the absolute quantitative estimation of the dyestuffs still awaits discovery at the hands of a skilled and resourceful experimentalist.

The method developed by Knecht and Hibbert, in which the dyestuff is estimated by means of titannous chloride is visual and in many cases the end-point is not sharply defined. Moreover, the method is only useful in those cases where the molecular weight of the dyestuff is known. If the color contains the reducible impurity or the homologues and isomerides of the dye to be estimated, the results will be inaccurate.

A neat method of estimating the direct dyestuffs has been recently developed by Neale and his co-workers. In this method, the dyed material is completely stripped by 25% aqueous pyridin and then the concentration of the dye is estimated by means of a Leitz-Duboscq colorimeter. The importance of this method cannot be over-estimated when it is realized that .01 milligram of the dye can be estimated very accurately by a careful adjustment of the stripping solution.

Effect of Time on the Absorption

The measurement of absorption of Benzo-purpurin 4B and Sky-Blue FF were carried out with progress of time till equilibrium values were obtained in presence of varying concentrations of different electrolytes. It is found that absorption increases with the increase in the time of dyeing, and after two or three hours reaches its maximum value. From these results, the rate of diffusion of the dye micelles into the intermicellar spaces of cellulose was calculated according to the equation of A. V. Hill (P.R.S. 104 B, 39, 1928). In Table III, the experimental and the calculated absorption values for a definite concentration (.0855 N.) of various electrolytes is given, along with the diffusion coefficient.

Table III

Comparison of observed absorption data for Sky-Blue FF with those from the assumed equilibrium absorption (D_∞) and diffusion coefficient (k), according to the equation of A. V. Hill.

Dye conc. = .05 g/l; Salt = .0855 N; Temp. = At the boil.

N. B. There are two values in each column, the first indicating experimental and the other calculated absorption.

Time in Minutes.

Electrolytes	2		5		10		15		20		30		60		90		120		Assumed Values D_∞ k g/100g (x10+8)
NaCl	.22	.23	.37	.35	.48	.49	.56	.58	.62	.63	.70	.69	.73	.72	.73	.73	.73	.73	.73 13.1
Na_2SO_4, $10H_2O$	.20	.19	.35	.36	.48	.48	.57	.57	.63	.64	.69	.68	.72	.69	.71	.72	.72	.72	.72 12.8
NH_4Cl	.30	.30	.48	.48	.68	.70	.77	.75	.84	.84	.90	.90	.94	.94	.95	.94	.94	.94	.94 13.1
$(NH_4)_2SO_4$	.30	.29	.49	.48	.68	.66	.76	.77	.83	.83	.90	.90	.93	.90	.93	.93	.93	.93	.93 12.8
$MgCl_2$, $6H_2O$	.24	.23	.45	.46	.67	.66	.78	.78	.86	.88	.96	.96	1.04	1.03	1.06	1.05	1.05	1.05	1.06 1.15
$CaCl_2$, $6H_2O$	.32	.27	.52	.53	.76	.75	.95	.94	1.06	1.04	1.19	1.14	1.25	1.26	1.28	1.28	1.28	1.28	1.28 8.9
$BaCl_2$, $2H_2O$	.48	.51	.84	.84	1.12	1.13	1.46	1.46	1.76	1.74	2.11	2.08	2.70	2.63	3.06	2.98	3.06	3.04	3.04 4.13
$Al_2(SO_4)_3$, $18H_2O$	.21	.17	.26	.26	.36	.37	.46	.44	.53	.53	.59	.57	.61	.61	.60	.61	.61	.61	.61 9.3
Na_2HPO_4, $12H_2O$	.15	.14	.27	.27	.38	.38	.43	.44	.48	.48	.50	.51	.53	.53	.53	.53	.52	.53	.53 14.2
KH_2PO_4	.30	.29	.48	.47	.70	.69	.85	.79	.92	.92	.96	.95	1.02	1.02	1.02	1.02	1.02	1.02	1.02 11.2

It is found that the absorption is most rapid at first and then gradually slows down until a state of equilibrium is reached. The time required for equilibrium to be reached slowly decreases with increasing concentration of added electrolyte, reaches a maximum value and then again increases with the addition of the greater amounts of the salt.

It is believed that the taking up of the dye by cellulose which is in a swollen or highly hydrated condition in the dye bath is a process of diffusion. The diffusion of the dye into the intermicellar spaces is comparatively much slower than absorption on the surface and falls off as the concentration gradient of the dye within the cellulose decreases. This explains why the rate of rise of the absorption-time curve steadily falls off. When the absorbed dyestuff is uniformly distributed across the section of the cellulose sheet, the absorption does not increase further but remains constant.

It has been stated above that the time required for the absorption to reach equilibrium first decreases and then increases with the addition of greater amounts of electrolytes. The rate at which the dye micelles diffuse into the cellulose under the influence of osmotic and electrical forces depends upon their size and on the swelling or hydration of the absorbent. In the work which has been carried out by the author, it has been shown that the hydration of cellulose is not appreciably affected by the addition of small amounts of electrolytes. The conclusion of Schramek and Götte (Kolloid Beihefte, 34, 218, 1932) that in presence of smaller amounts of electrolytes, the particle size decreases, reaches a minimum and then increases with the addition of greater salt concentration could, if substantiated, adequately explain the above results. There are reasons, however, to suppose that the Stokes-Einstein equation used by them to calculate the particle size is not applicable to colloidal electrolytes, since it attributes the diffusion entirely to osmotic forces. Hartley and Robinson have shown that the electrical forces are of greater significance and that an entirely new interpretation must be made.

Effect of Electrolytes on the Absorption at Equilibrium

In Tables I and II, the equilibrium absorption values of Benzo-purpurin 4B and Sky-Blue FF in presence of varying concentrations of various electrolytes are given.

The factor of paramount importance, which greatly affects the absorption of the dyestuffs, is their condition in solution. It has been previously pointed out that many of the substantive cotton dyestuffs exist in the form of colloidal electrolytes. The dye, on being dissolved in water, slightly dissociates. If R.Na represents a dye molecule of a mono-sulfonate, its condition in solution can, schematically, be represented as follows:

$$\boxed{\begin{matrix} R.Na \\ H.R \end{matrix} \quad H_2O} \; \overline{R}$$

In the above representation, it is correctly assumed that the dye molecule, besides dissociation, undergoes slight hydrolysis and becomes enveloped with water molecules to a certain extent in most of the cases. Thus, in solution, we have a neutral colloid consisting of undissociated dye molecule and another part, peculiar to the dyes, namely, the ionic micelles, as shown above. These are presumably aggregates of acid anions forming one polyvalent anion in equilibrium with a corresponding number of free alkali ions. The osmotic properties of the solution are, then, wholly due to the slight quantity of the dye in true solution and the alkali ions of the ionic micelles. The remaining constituents are practically inactive osmotically. The dye micelles are, thus, negatively charged and their behavior towards the action of electrolytes is brought in line with that of negatively charged inorganic hydrosols.

The stability of inorganic hydrosols depends upon their charge and the degree of hydration. In the case of dye solutions it has been found by Robinson and Mills (loc. cit.) that Benzo-purpurin 4B was hydrated to a negligible extent. Thus, so far as the dyes are concerned, the predominant factor is the charge. Any agent that brings about destabilization, such as inorganic salts, will decrease the charge and bring about greater aggregation of the dye micelles, whereas those which exert a peptizing influence, such as small amounts of alkali and protective colloids like soap and gelatin, will decrease the aggregation of the particles and make the dye solution more stable towards electrolytes.

The state of the dye in solution depends upon the following factors:

(1) The medium in which it is dissolved or dispersed.
(2) Concentration and nature of the added electrolyte.
(3) Addition of protective colloids.
(4) Temperature of the dye bath.
(5) Concentration of the dye.

When the various mono-valent cations are compared (cf. Tables I and II), it is found that those which, from their effect on colloids, in general, are known to be strong destabilizing agents, increase the absorption more than those which are less effective destabilizing agents. Thus, it is seen that the absorption is greater in presence of equivalent amounts of potassium chloride than that in presence of sodium chloride or sodium sulfate. The effect of the anion seems to be of the second order only. These results indicate that any factor which increases the aggregation of the dye micelles increases the absorption.

From the results given in Table II, it will be seen that up to an electrolyte concentration of .0855 N, the absorption is in the following decreasing order:

$$BaCl_2 > CaCl_2 > ZnSO_4 > MgCl_2 > NH_4Cl = (NH_4)_2SO_4 > NaCl = Na_2SO_4 > KH_2PO_4 > Na_2HPO_4$$

(Continued on page 521)

Pressure and Tension in Textile Finishing

By G. L. ATKINSON

PRESSURE and tension are important factors in the preparing, dyeing and finishing of textile fabrics, inasmuch as they are necessary, if the best results are to be obtained with regard to handle and finish, when the goods are finally pressed. In addition, misuse or wrong application of these two factors is certain not only to unsatisfactory results, but also to cause actual faults in the goods, during the various finishing operations.

In the first place it should be remembered, that with regard to pressure and tension placed upon goods, that it is either too heavy or too light if incorrect. As pressure and tension are placed upon the piece goods in some form or another, throughout every finishing operation, the importance of these two factors cannot be disregarded, and the following hints, which are the result of considerable experience, may help to reduce faults in cloths and keep down the production costs of fabrics being finished in general.

The crabbing operation, which is a particularly important preparing process, as here the effect upon the cloth is two-fold, the final finish and handle is determined or assisted during this process, and in addition the process is often utilized for the prevention of faults occurring in the cloth during ensuing process. This process well illustrates the importance of these two factors, pressure and tension, for the success of the crabbing operation is dependent upon them.

The effects of these two factors in this operation are readily appreciated in theory, but scarcely sufficient attention has been directed to them in actual practice. In addition, although attention is directed to the crab itself, this should be carried a stage further, that is towards the running of the goods on to the crabbing machine. This is generally accomplished in one of three ways: 1. The goods are run on to the machine out of a cart or truck. 2. Off the floor of the preparing department. 3. The goods are beamed prior to being run on to the crabbing machine.

The first two methods of running the goods on are still in active use today, but are not recommended, for these methods cause jerking and jumping of the goods with resultant faults in the cloth when the goods are finished. The last mentioned method is to be recommended for jerking with consequent faults in the fabric when crabbed are reduced to a minimum.

In the beaming of fabrics for crabbing, the goods are wound under tension, at open width on to a wooden roller. It will be noted that in this instance, tension plays an important part. It is vital if the goods are to be successfully crabbed, that the tension throughout the whole of the beaming operation, shall be constant. When the goods are beamed upon the wooden roller, the roll of pieces and wrappers is placed in position behind the crabbing machine, and any alteration in tension during the beaming of the goods, also occurs when the pieces are running into the bowl of the crab. This means that the tension in some part of a piece when on the crabbing roller is not equal to that of other parts of the piece, with the result in unequal crabbing results and the "set" of the cloth will not be even throughout the piece. It might be mentioned that often this fault is attributed to the bad flow of the crabbing liquor, or to the crabbing liquor not being properly boiled up, but more often it is due to uneven tension placed upon the goods, during both beaming and running into the crab bowls.

The writer has noted many instances where goods are crabbed without the assistance of wrappers. This should never be attempted, because the use of a cotton wrapper wider than the goods to be crabbed, and about ten to fifteen yards in length, enables the operatives to set the machine in motion and adjust the tension, before the goods are actually running onto the machine.

As previously mentioned, pressure and tension are necessary for the success of the crabbing operation, and that the tension upon the goods, during the beaming, running on and through the machine should be constant is not only necessary but vital. In addition to the tension

placed upon the goods in the manner indicated, there is also pressure upon the goods when wound round the crabbing roller in the crab bowl. This depends to a certain extent upon the tension placed upon the goods during the beaming and running on, but to a greater degree to the number of pieces run into the crab bowl. Many firms even today do not consider that they have anything to learn in this direction apart from knowing the capacity of the crab bowls. This is far from the case, actually the capacity of the crab bowls in ninety per cent of cases has little or no bearing on the matter. It is the nature of the fabric which dictates how many pieces can be run with safety into the crab bowl at once. It is with very few fabrics in the dress and coating trade, that the capacity of the crab bowls can be utilized to the full. As an illustration we might mention botany poplins, where in no case in the crabbing of these goods can the full capacity of the crab bowl be utilized. This is due to these cloths being very prone to develop a fault known as watering or embossing. With some types of this cloth, this fault can be caused if the tension applied to the goods during beaming and running onto the machine is too great, so the matter of pressure in the crab bowls may well be deemed important. It will be appreciated that when the goods are entirely wrapped around the crabbing roller in the bowl of the crab, that the pressure exerted upon the inner folds of the roll is greater than that exerted upon the outer layers of the roll. This is in itself sufficient to cause watering or embossing of the fabric, and in some cases uneven "set." It will also be appreciated that the greater the number of pieces run into the crab bowl, the greater the pressure upon the inner folds of the roll. This is the cause of over ninety per cent of watering cases on the crabbing machine. It is also the direct result of too many pieces being run into the crab bowl together, and in the case of poplin and kindred goods produces the faults of watering or embossing.

Machines

Crabbing machines today generally are equipped with crabbing bowls in which up to ten pieces can be crabbed at once, although to attempt to utilize the full capacity of the crab bowl in the case of poplin and kindred goods is to court disaster. When it is known that only in rare instances can more than four pieces of poplin cloth be crabbed at once, the importance of pressure in the crab bowls will be readily appreciated. In no case is the capacity of the crab bowls any guide, this is always determined by the cloth and the amount of pressure that may be exerted upon it, which is always at first a matter of experiment. It might be stated that far too many crabbing faults, and poorly finished goods are directly due to too many pieces being run into the crab bowl at once. It is to be regretted that at the present moment little thought is given to this small yet vital matter.

Even when the pressure and tension placed upon the goods is correct, it should be remembered that both ends of the roll of pieces on the crabbing roller will not be alike from a crabbing point of view, the inner folds of the roll being subjected to a greater pressure than the outer layers. It is therefore essential that if the result obtained throughout the pieces is to be uniform, then the goods will have to be run into a second bowl, or run off and reversed upon the same crabbing roller.

There are two types of crabbing machines in general use today, namely the two bowl machine, which is generally equipped with top weight arrangement and steaming apparatus, and the three bowl crabbing machine, which has neither top weight arrangement or steaming apparatus as a rule. In the two bowl machine the pressure upon the inner folds of the first crabbing roller is equalized by the running of the goods into the second bowl of the machine, as the goods in this case are reversed in their order upon the crabbing roller and the pressure by this means is equalized. This does not apply, of course, to the three bowl crabbing machine, where obviously some of the pieces in the crab bowl must be subjected to a greater pressure than others, owing to the fact that the pressure upon the goods is not equal throughout the bowls of the crab. Obviously then the three bowl crabbing machine is not a suitable machine upon which to crab cloths which are extremely susceptible to pressure, namely poplin and kindred fabrics.

The two bowl crabbing machine is also equipped with top weight arrangement, this being utilized in many cases to obtain even crabbing. This arrangement consists of a roller, generally in the second bowl of the machine, which can be raised or lowered at will. By this means pressure is placed upon the goods when required. This is quite distinct from the tension placed upon the goods, as they are running from the first to the second crab bowl, generally by means of a drag weight slung round the outside of the axis of the first crabbing roller. The top weight is generally utilized in the second bowl of the machine in the crabbing of goods with woolen weft as by this means the danger of the woolen fibers bursting is reduced to a minimum. This roller is lowered onto the goods, the pressure placed upon them differing according to the type of fabric. It should be noted that this roller should only be placed upon the goods when the pieces are wrapped entirely around the crabbing roller, *and not* when the goods are running into the second bowl of the machine. The writer has noted many instances of this wrong use of the top weight roller, for if this is placed upon the goods as they are running into the crab bowls, the inner folds of the pieces are subjected to a much greater pressure than is the case when the roller is placed on the goods as they are wrapped entirely around the crabbing roller. The pressure in this case is greater upon the inner folds of the cloth, but not to the extent

that occurs when it is placed upon the goods as they are running onto the crabbing roller. In the majority of cases this is not sufficient to cause reversing or re-running of the goods into the crab bowl.

If the pressure and tension throughout this operation are too great then with poplin and kindred goods, watering or embossing of the fabric occurs, if too great in the case of serges, etc., cross-twilling of the fabrics generally develops, piece end marking, etc. On the other hand, if the pressure is too light, uneven crabbing, cockling or even crimping will result. Another effect if the pressure and tension are not great enough is that apart from the fabric suffering from uneven "set" which in many instances produces cockling, the width of the piece goods suffers badly. In cases where the pressure and tension throughout the crabbing operation are not constant, the result is always found in the width of the goods.

One Exception

There is one case where the pressure and tension during the crabbing operation may be allowed a certain latitude so to speak. That is when goods, and often these are poplin and kindred fabrics, which after passing through the bowls of the crab, are to be steamed. In this operation the goods are wound upon a perforated steaming roller. The adjustment of the tension here is necessary if the goods are not to be watered, but this has little or no effect upon the actual "setting" of the cloth, this being accomplished entirely by the steaming of the fabric.

This is one of those isolated cases where the perfectly even and permanent setting of the fabric, is not accomplished by means of tension and pressure placed upon the cloth in the bowls of the crabbing machine. The cloth is perhaps "set" in this instance at the highest temperature possible, and as no process (except in rare instances the dyeing operation) exceeds this temperature, the "set" of the cloth is not disturbed and cockling and other faults do not occur in the fabric. It should be noted that in this instance of the setting of the cloth by means of steaming on the crab, that it is possible to take a piece which is badly cockled or unevenly crabbed in the bowls of the machine on to the steaming roller, and obviate these faults by steaming. There is only one regret with regard to the steaming operation on the crab, and that is it is not possible to "set" every cloth in this manner, owing to reasons of finish and handle.

Pressure and tension are equally important in the scouring operations. Too heavy scouring rollers, or wrong adjustment of the roller springs (where fitted) often causes the cloth to travel in a sideways direction, causing running marks, which are very difficult to obviate. These generally often extend in a slantwise direction, from the lists of the fabric about a foot or a foot and a half into the fabric. In addition mill rigging, chafing and crimping are often started from this cause. It is supremely important that the goods should be well drafted out, the pressure on the scouring rollers, carefully adjusted and the poundage in the vessel carefully watched. In the decatizing operation the same thing occurs. Tension is placed upon the goods, both by the tension rails of the machine and also by the brake drums on the steaming cans, which control the tension upon the blowing wrapper. This tension should be regulated for each varying type of piece, and in addition from the pieces, the correct tension results in the blowing wrapper of the machine having a much longer life.

In all textile operations, where the pressure and tension are important as in the crabbing operation, the pressure and tension must *be correct* if the best results with regard to finish and handle are to be obtained, faults in cloths reduced to a minimum and production costs kept within reasonable proportions. It will be appreciated that the pressure and tension being too light is often just as great an evil as being too heavy.

• NEW ORGANIZATION

G. S. McCarty and associates have organized the Carolina Aniline & Extract Company with plant and general offices located at 1122 South Boulevard, Charlotte, N. C.

Mr. McCarty is president of the organization, David E. Paterson is vice-president and William W. Ray, secretary and treasurer. The company, we understand, is capitalized at $25,000 which is fully paid in.

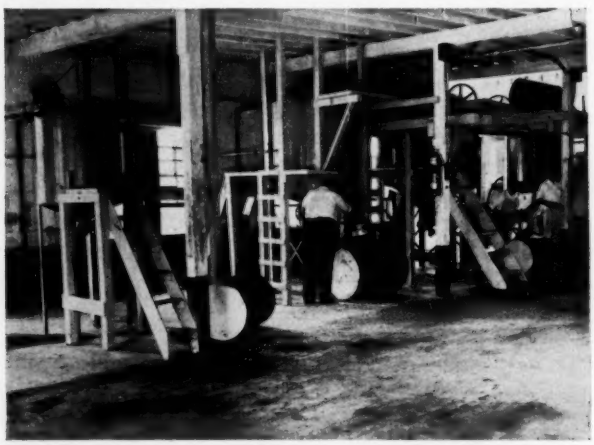
• PRESIDENT

The equipment consists of two large Monel metal sulfonators and a special cooling system to permit perfect sulfonation during the hottest weather being regulated by special thermostatic control. The plant also has equipment

• LABORATORY

for manufacture of compounded oil as well as special equipment for the manufacture of reducing agents for stripping. We also understand that sulfonating is being done by an entirely new method for which patents have been applied for. The machinery of the modern plant was designed by the company's own technical department in collaboration with the International Nickel Company and was constructed by the Mecklenburg Iron Works.

● INTERIOR OF THE PLANT



Mr. Ray, formerly connected with the Whittner Oil & Gas properties of Pittsburgh, is in charge of the plant. The organization has a completely equipped laboratory for analytical and research work.

Mr. McCarty is in charge of sales and the company plans to organize a sales force to cover the entire South, South-west and West with some manufactured products being shipped into the eastern textile territory to jobbers and agents.

● NEW DEPARTMENT

With this issue of the REPORTER we are inaugurating a new department for our readers. We haven't decided on any name for it and so we are open to suggestions. We intend to run in these columns personal news items which we hope will be of interest to all dyers, finishers, chemists, bleachers, etc. Knowing that our readers are interested in the lighter side of life as well as the technicalities of wet processing we believe that this department should have a wide appeal. As we cannot personally contact all of the mills to learn what is going on outside the mill we shall have to depend to a large extent upon our readers to act as correspondents for us. So keep this in mind and watch this column,—you will no doubt hear about some of your friends whom you haven't seen in some time.

Here are a couple of items wired in by one of our alert readers in the Pennsylvania sector:

Golf—

"Ted" Kramer, dyer for the Oakbrook Hosiery Company in Reading, Pa., whose present chief interest is golf, realized a life long ambition on September Morn by defeating Jay Fidler of the Liberty Dye Works (five down) and J. Clinton Bach, former Reading city official, (nine down) at the Reading Country Club golf course. He claims that he did it all for the wife and kiddies but our correspondent is of the opinion that all his winnings were squandered at the nineteenth hole. Looks like another triple-title holder in the offing!

Herc—

Bill Knerr of the Liberty Dye Works resigned himself to fate on Labor Day Morning and chose that time to play golf with his wife and sister-in-law. Bring-em-back-alive, Bill!

Now that you get the idea of the column start sending in material and suggestions for a name for this department. We might even give a prize—send in suggestions for a prize, too. See you next issue!

● NEW CALCO SULFUR COLORS

The Calco Chemical Co. announces the following new colors:

Calcogene Blue BC6R Conc.—reddest of the sulfur navy blues and said to be one of the most useful in the production of deep rich navies in the single or standing bath. It is said to be completely soluble in less than equal weights of sulfide.

Calcogene Brilliant Blue 3GB—a new green shade of brilliant blue. It is said to be exceptional in working qualities, brightness and all around fastness. It is also more of a direct dyeing color than most of the sulfur brilliant blues.

Calcogene Bordeaux 6R—said to be one of the reddest and brightest of the copper containing sulfur bordeaux standards and recommended by the manufacturers chiefly as a self-shade.

Calcogene Red Brown RCF—a full red shade of sulfur brown which is said to maintain its shade on after-treatment and does not change its original shade by air oxidation.

Calcogene Olive Yellow CK Extra—a brand new sulfur dyestuff of the olive drab type which, when after-treated is said to have vat color fastness to light and washing.

Calcogene Blue BC2G—a very bright greenish shade of navy which is said not to require any shading color which has heretofore been found necessary to obtain bright navies.

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

September 10, 1934

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North Carolina State College Student Section
H. S. Bliven, Chairman; D. B. Hardin, Secretary.

Members should notify the **Secretary** immediately of all address changes

OUTING OF PHILADELPHIA SECTION

THE seasons final meeting of the Philadelphia Section, in the form of an outing, was held on Friday, June 15th, at the Torresdale Golf and Country Club, Torresdale, Philadelphia.

During the afternoon, golf, tennis and other sports were in order and in the evening prizes were awarded to those who excelled in these activities.

A total of 140 members and guests were present at the dinner in the evening.

No papers were presented, but during a brief business meeting, the following gentlemen were elected to serve during the ensuing year:

Chairman—Robert A. Bruce.
Vice-Chairman—Robert E. Sullivan.
Treasurer—Herbert S. Travis.
Secretary—Charles A. Seibert.
Sectional Committee—W. G. Hamlen, Jr., D. McGowan, Jr., R. M. Ritter and W. A. Stringfellow.
Councillor—Eugene C. Knaeble.
Member of the Nominating Committee—C. A. Seibert.
Chairman Emeritus—Elmer C. Bertolet.

After dinner, group conversation was in order until shortly before midnight.

Respectfully submitted,

CHARLES A. SEIBERT,
Secretary

APPLICANTS FOR MEMBERSHIP

Active

C. D. Blackwelder—Head, Chem. Engr. Dept., J. E. Sirrine & Co., Greenville, S. C. Sponsors: C. H. Stone and J. E. Moore.

Frederic C. Bray—Salesman, John Campbell & Co., Voluntown, Conn. Sponsors: R. E. Derby and J. H. Brady.

Earl Wm. Bullard—Supt. of Dyeing, Charlton Woolen Co., Charlton City, Mass. Sponsors: J. C. Tebbetts and G. D. Clarke.

(Continued on page [264] 516)

Proceedings of the American Association of Textile Chemists and Colorists

Quick Tests

for Certain Properties and Causes of Faults

in Rayon Yarns and Fabrics

A Publication of the Rayon Sub-Committee

THE Rayon Sub-Committee of the A. A. T. C. C. presents below a group of tests all of which are used by one or more of its members in the course of their work with rayon yarns and fabrics. The tests are unrelated to each other and for the most part are practical rather than scientific. They have, however, proven useful to the individual members of the Commitee and are presented here in the hope that they may be of some use and value to others.

Certain of these tests have originated with members of the Rayon Sub-Committee. Others have been taken from various sources and adapted to the specific needs of those engaged in determining the cause of troubles found in rayon yarns and fabrics.

The Sub-Committee regrets that these tests are so few in number and hopes to be able to add other tests from time to time as they are developed.

Before presenting these practical and unrelated tests, we wish to point out that we have found good practice dictates yarn identification, denier, filament count, and tensile and elongation determinations be applied to every unknown case before further tests are resorted to.

(1) REMOVAL OF RAYON FROM MIXED FABRICS

The methods of removing the various types of rayon from mixed fabrics presented below cannot be used for an analytical separation but have been found exceedingly useful in removing certain types of yarns from mixed fabrics thus facilitating study to the remaining yarns. Milanese and novelty fabrics can often be advantageously studied in this way.

(1A) Removal of Silk from Mixtures Containing Viscose, Nitrocellulose, Cuprammonium or Cellulose Acetate Rayon or Cotton or Other Cellulose Fibers.

*Preparation of Alkaline Copper Glycerol**

Dissolve 10 grams $CuSO_4$—$5H_2O$ in 100 c.c. of water, add 5 c.c. glycerine, add 20% NaOH solution slowly until the precipitate at first formed is dissolved.

Removal of Silk from Mixed Fabric

Immerse fabric 10-12 minutes at room temperature in alkaline copper glycerol† prepared as described above. If silk resists solution, warm gently and work until silk has been completely dissolved.

After silk has disappeared rinse and dry the fabric.

(1B) Removal of Regenerated Cellulose Rayons and Cellulose Fibers from Silk, Wool and Cellulose Acetate Rayon.

Preparation of Carbonizing Paste

Prepare a stiff gum paste using Gum Arabic or a similar natural gum; add 15% by weight of anhydrous aluminum chloride.

Removal of Regenerated Cellulose Rayons and Cellulose Fibers from Mixed Fabric

(1) Saturate the fabric with aluminum chloride paste prepared as described above.

(2) Dry the fabric in air or in drying oven.

(3) Press on both sides with iron heated to 350-375 degrees Fahrenheit until fabric turns light tan in shade.

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* A. S. T. M., Page 1026, Vol. 31 (1931), Part 1.

† The alkaline copper glycerol solution should be reasonably fresh.

(4) Work the fabric gently with the hands thus pulverizing the carbonized gum and cellulose material.

(5) Wash in warm soap and water.

(6) Rinse and dry.

(1C) Removal of Acetate Rayon from Fabric Containing Other Fibers.

Cellulose acetate can be readily removed from mixtures by dissolving the cellulose acetate in acetone.

Iron proofed and saponified cellulose acetate cannot be removed from mixtures in this manner.

(2) MICROSCOPIC REMOVAL OF RAYON FROM MIXED FABRICS*

Examination of a mixed fabric for foreign materials and for the nature of certain defects is greatly facilitated by using mounting media possessing the proper index of refraction to microscopically "remove" one of the fibers from the fabric. The media described below are not presented as being in any way new or novel but are presented with the assurance that they have been found useful in practice.

Whereas the refractive index numbers of the fibers and oils involved in this test have been listed below, we wish to state that it is not necessary for the investigator to have available a refractometer. By starting with an oil, the refractive index of which is slightly below the fiber to be "removed" and adding one drop at a time an oil, the refractive index of which is slightly higher than the fiber, it is possible to produce a suitable mixture empirically.

"It is satisfactory to use an ordinary microscope having magnification of 50 to 100×. Ordinary daylight is a good light source and artificial light from a 'daylight' bulb can be used. Although the index of refraction varies with the temperature, sufficiently accurate results can be obtained at room temperatures. The object slides and cover glasses should be cleaned and free from lint, dust, etc."

"Occasionally, the fibers are completely removed when immersed in an oil having the proper index of refraction. Usually this is not the case as occluded dirt or foreign materials in the fibers themselves are generally present. Also delicate colors of Blues, Yellows, Pinks and Greens may appear in the place of the 'removed' fiber."

(2A) Removal of Acetate (refractive index 1.47)

Lemon oil possessing a refractive index of 1.47 has been found satisfactory for this purpose.

(2B) Removal of Cotton and Regenerated Cellulose Rayon (refractive index 1.53)

Clove oil (refractive index 1.528-1.537) plus a little oil of mirbane (nitro-benzene, refractive index 1.55) the mixture being compounded to give a refractive index of 1.53 effectively removes cotton and rayon microscopically. The compounded oil should be protected from light.

(2C) Removal of Canton Silk (refractive index 1.58)

Bromoform ($CHBr_3$) index of refraction of 1.59 is satisfactory.

(2D) Removal of Wool (refractive index 1,545)

A mixture of clove oil (refractive index 1.528-1.537) and oil of mirbane (nitro-benzene, refractive index 1.55) the refractive index of the compounded oil being 1.545 effectively removes wool microscopically from other fibers. The compounded oil should be protected from light.

(3) QUICK DETERMINATION OF COMPLETENESS OF DESIZING OF ACETATE WARP LADIES' DRESS CREPE FABRICS

This test is based on the fact that Methylene Blue, cold, has very little affinity for acetate yarn but has a very great affinity for oils and sizing ingredients, particularly gelatine and glues.

A small sample of the fabric to be tested is immersed for five minutes in a dilute solution—approximately one-hundredth of one per cent of methylene blue at room temperature after which the fabric is given a quick rinse in cold water. Sizing materials, if present, will be colored bright blue.

This test has been found especially valuable in determining whether or not a given batch of fabric has been adequately cleansed before dyeing. Care must be taken in interpreting results are partially saponified acetate is colored blue by this test.

(4) QUICK DETERMINATION OF TWIST IN COMBINATION ACETATE THREADS

The thread is cross-dyed and held at uniform tension under a one-inch pick glass. The twist count can be readily determined by counting the spirals. The test is especially well adapted for coarse count yarns.

(5) SHORT LENGTH DENIER DETERMINATIONS

To avoid unnecessary calculations when the denier of short lengths of rayon must be determined—weigh 90 cm. of yarn. The weight in milligrams gives the denier directly.

"It should be borne in mind that the accuracy of denier determinations necessarily decreases as the length of yarn measured and weighed decreases. On very short lengths, only the approximate denier can be determined in the manner described in this test,"

* Methods are similar to those listed by Chamot and Mason.

(6) QUICK CROSS-SECTION DETERMINATION OF SHORT LENGTHS OF YARN

To obtain a quick rough cross-sectional view of a short strand of yarn—twist the unknown yarn with a "filler" of a known yarn of different color and pull the twisted mass into the brass condenser of the well known disc method of cross-sectioning. Proceed as usual with disc method.

When tricot and milanese fabrics must be examined for yarn identification, the tedious work of unraveling the fabric can be avoided by pulling a small piece of the fabric through the condenser and proceeding as usual.

The "brass condenser" of the disc method of cross-sectioning was described in detail in the January 7th, 1929, issue of the AMERICAN DYESTUFF REPORTER by Mr. A. K. Johnson. The brass condenser consists of a piece of brass rod through the center of which has been bored a small hole, one side of which has been countersunk to facilitate threading with yarn to be cut and to serve as a means of firmly holding the sample in place.

This disc has been largely superseded by a chromium plated microscopic slide containing several holes of various sizes, each being countersunk on one side of the plate.

Many investigators prefer to work with a high grade cork. The procedure is simple. The cork is split to the center with a sharp razor blade, the thread is drawn into this slit after which the cork and thread are sectioned carefully with a sharp razor blade. The thin section of cork and yarn thus prepared are placed upon a microscopic slide for study.

(7) KNITTING TEST

Uneven stitches in circular knit goods produce a barré effect in the goods. While examination under a simple lens or better a low power binocular microscope will show uneven stitch, it is sometimes desirable to obtain figures to prove the magnitude of this defect. By marking the fabric and unraveling a definite amount of each feed, say for example one complete course and then measuring the length of the yarn so obtained a complete picture of the way the machine was set can be obtained. The yarn when measured should be under sufficient tension to straighten out the kinks. Deniers must be determined on each of the feeds as an off denier yarn has a definite influence and deductions made as to the set of the machine without denier determinations would be incorrect.

APPLICANTS FOR MEMBERSHIP

(Continued from page [261] 513)

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AMERICAN
DYESTUFF
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Vol. XXIII September 10, 1934 No. 19

STRIKE

AT this writing the general textile strike is well under way and in all probability there will be still further walkouts. A board of mediation headed by Governor Winant of New Hampshire has been appointed upon the request of Garrison, chairman of the National Labor Relations Board. This latter board had attempted to prevent the strike or to bring about a truce, but failing, its chairman had requested the appointment of a special committee for the express and specific purpose of mediation. This plan has received the approval of the mill owners through its spokesman, George Sloan, and the unions have accepted it provided they do not have to accept the decision of the mediation board as final and providing that the strike will continue during the process of mediation.

Which means, as far as we can see that the unions intend to stay on strike until their demands are granted or they are forced to admit defeat. To us it seems that the mill owners are in a much stronger position than the strikers. The unions have about $1 per man to support the strike. The mills have stock surpluses which will last anywhere from 2 to 9 months, depending upon the type of material manufactured and the individual mill itself. When the strike boils down to a question of who can hold out the longest it looks as if the mill owners hold the best cards.

To date some violence has been noted and it was probably this occurrence that caused the President to appoint the mediation board in the hope that it would tend to suppress further violence. With the settlement of the strike in the hands of this board it would seem to leave but little excuse for the unions to engage in further violence to attempt coercion of other workers.

There appears to be a lack of forethought on the part of the union leaders in attempting a strike at this particular time. A year ago they would probably have had more chance at success than now when the mills have a surplus on hand. In fact many of the mill owners have probably welcomed the shutdown.

In view of the conditions under which the textile workers are striking it seems as though the unions are more interested in a display of their strength rather than in obtaining any special concessions. This is something for the future mill owners to think about.

NEW DEPARTMENTS

A FEW months ago we initiated or rather revived a department of the REPORTER which we have called the "Open Forum". To date it has enjoyed fair success and we believe that the readers are in favor of its continuance. With the close of the summer months we expect this department to grow. The one important thing that determines the success of such a department is reader interest and reader support. The readers supply the questions and the readers supply the answers. In fact all the REPORTER does is to act as a medium for the expression of our readers' thoughts.

Another department which we are starting this issue has not as yet received any title. We are waiting until someone suggests a good one for us or we can think of a better one ourselves. This department too will depend upon reader interest for its success. You will find further information regarding this new addition on the page preceding the Proceedings Section. We want you to look it over and let us know if you want us to continue it, if we should modify it, or if we should call it a bad dream and forget about it.

The more closely we contact our readers the more interesting will this publication become to them and so these two departments should help us to firmly establish those contacts—one for the serious and the other for the less serious. We will appreciate your support of these two departments and your criticisms of either.

● SILK NEWS

Styles are launched by the American designer and the French couture, but they do not become a fashion until they are worn. Paris cables have reported pure silk fabrics featured in the August collections. American designers have been working in pure silk fabrics for the past two months, according to J. M. Golby, executive secretary of the Fashion Originators' Guild.

The final endorsement of silk prestige was announced recently by the International Silk Guild. An assurance that silk will be chosen and worn this fall by Park Avenue, which in turn determines the fashions of Main Street, had been given before the new imports arrived or the retailer had an opportunity to show the new mode in his shop widows.

In a letter to the International Silk Guild from Mrs. Frank A. Vanderlip, honorary chairman of the Green Ball of Art and Fashion, which will be one of the outstanding events on the social calendar, representing one of the most powerful groups for fashion acceptance in this country, states:

"The Committee would like you to know that the Green Ball of Art and Fashion, to be held October 25th at the Waldorf-Astoria for the benefit of the N. Y. Infirmary for Women and Children, will use silks and silk velvets in the tableaux and Fashion Show about which the Ball centers."

● EXPORTS INCREASE

Stimulated by favorable exchange and improved conditions in many foreign markets, exports of chemicals and related products increased 31 per cent to a value of approximately $61,000,000 during the first half of 1934, according to C. C. Concannon, Chief of the Commerce Department's Chemical Division. Quantity increases are not available in all instances but such as are recorded indicate substantial gains generally throughout the list.

Notable increases were made in exports of industrial chemicals which increased 45 per cent over the first half of 1933 to a value of $10,411,000; coal tar products advanced 12 per cent to $7,397,700; naval stores, gums and resins, 17½ per cent to $7,110,500; pigments, paints, and varnishes, 37 per cent to $6,622,000; industrial chemical specialties, 21½ per cent to $6,009,000; and fertilizer and fertilizer materials 93 per cent to $5,960,000, statistics show.

Other important gains were registered with medicinals which increased 6½ per cent over the first half of 1933; industrial explosives, 40 per cent; soaps and toilet preparations, 11½ per cent; pyroxylin products, 92 per cent; sulfur, 30 per cent; synthetic resins, approximately 100 per cent; and essential and distilled oils, 27 per cent.

Synthetic resins and pyroxylin products continue to gain steadily and may now be numbered among important chemical export items, according to Concannon. During the first half of 1934 exports of pyroxylin products were valued at $2,084,000 compared with $1,456,000 during the corresponding period of 1933, and with $3,325,700 for the whole year of 1929. Exports of celluloid film base alone amounted to 1,846,000 pounds, valued at $1,630,600, during the first half of 1934. Overseas shipments of synthetic resin products during the first half of 1934 were valued at $163,642, compared with $85,000 for the corresponding period of last year.

● COLUMBIA EVENING TEXTILE COURSES
Fall, 1934

Course eZ 1.—Spinning and Weaving of Cotton. 7:30 to 9:20 P. M., Monday nights, Room 410B, Mines Building, by H. R. Mauersberger. Begins October 1st.

Course eZ 3.—Spinning and Weaving of Rayon. 7:30 to 9:20 P. M., Thursday nights, Room 410B, Mines Building, by H. R. Mauersberger. Begins September 27th.

Course eZ 5.—Design for Textiles. 7:30 to 9:20 P. M., Monday nights, Room 410B, Engineering Building, by Wm. H. Arlt. Begins October 1st.

All courses consist of fifteen lectures. Registration begins September 19th, 1934. All courses require a fee of $20 plus $7 registration. Consultation with students is held during Registration period in Room 301, School of Business, 116th Street and Broadway, New York City.

It is to be noted that the course on cotton and the course on design which were formerly given on Friday nights will now be given on Monday nights.

● PHILADELPHIA TEXTILE COURSES

The Department of Chemistry and Dyeing of the Philadelphia Textile School announces two new courses in the Evening School starting October 1st, 1934, as follows:

1. *Textile Fibers and Microscopy of Textile Fibers*

This course deals with the origin, chemical and physical properties of the various textile fibers used for the many and varied textile purposes. Special attention is given to the use of the microscope in the examination of the structure of typical fibers. Numerous commercial samples are analyzed to identify the materials from which they are made. One night, Monday each week, from 7:30 to 9:30, for the term of six months.

2. *Textile Chemistry*

This is an introductory course of interest to those who have studied general inorganic chemistry. This course will familiarize those in the textile field with the methods used in the examination of those things that are of fundamental importance in the industry. Practical work in analysis and testing of important textile materials and products is given. One night, Friday each week, from 7:30 to 9:30, for the term of six months.

These courses are of general interest and will be found of real value to all who are engaged in the textile field. Especially are they commended as offering desirable supplementary work for those of former students who hold certificates from the Evening School, as in previous years the school was not in a position to make such an offer. Registration can be made at the School or by letter.

The Influence of Bleaching on the Whiteness and Tensile Strength of Cotton Fabrics

By **GEORGE H. JOHNSON, A. I. ANDERSON, H. O. PARKER, J. D. MacMAHON**

(*Abstracted from Special Report No. 53 of the Laundry Owners Association*)

A COMMERCIAL plant study recently completed at the American Institute of Laundering has disclosed information about bleaching that will be of practical value to the entire laundry industry. The results of this investigation dealing with the influence of bleaching on whiteness and tensile strength of white cotton fabrics, justify the following general conclusions:

1. Different cotton fabrics, when subjected to the same washing formula, show a wide variation in the degree to which they retain their original whiteness and pre-laundered tensile strength.
2. To obtain satisfactory whiteness retention in white cotton fabrics the use of bleach is required in the washing formula.
3. To obtain satisfactory whiteness retention, no more than two quarts of a 1.0% available chlorine solution is required for each 100 pounds dry weight of load in the washer. Any use of bleach in excess of this amount rapidly increases tensile strength losses, but results in practically no improvement in whiteness.
4. To obtain satisfactory whiteness retention, efficient detergent operations are also required.
5. Conclusions 2, 3 and 4 clearly show (1) that it is impractical to attempt to wash work white and (2) that it is unsafe to try to bleach work clean.

(For a graphical summary of the results of this investigation see Figure 1*.)

Laundry Bleaching

The foregoing conclusions will be of particular interest to laundry operators who have been inclined to blame bleaching for most failures on the part of the washroom to turn out an acceptable quality of work. The question is often raised as to whether bleaching is really essential to good laundering and, if so, why and how the use of bleach should be controlled in order that it may play a constructive part in washroom operations.

It is well known that the active agent in all laundry bleaches is sodium hypochlorite, irrespective of the chlorine carrier used or the method employed in preparing bleach solutions. This agent whitens cotton fabrics through an oxidizing action in the same manner as sunlight. But when there is more bleach used in the washer than the amount required to whiten the load, an excessive oxidizing action is then exerted on the cotton fibers. This causes an unnecessary loss in tensile strength. A similar tendering is observed in fabrics after prolonged exposure to direct sunlight.

A consideration of these facts about the action of bleach points to the necessity for control of the bleaching opera-

Figure 1—Composite Graph Showing Influence of Bleaching on Whiteness and Tensile Strength of Cotton Fabrics.

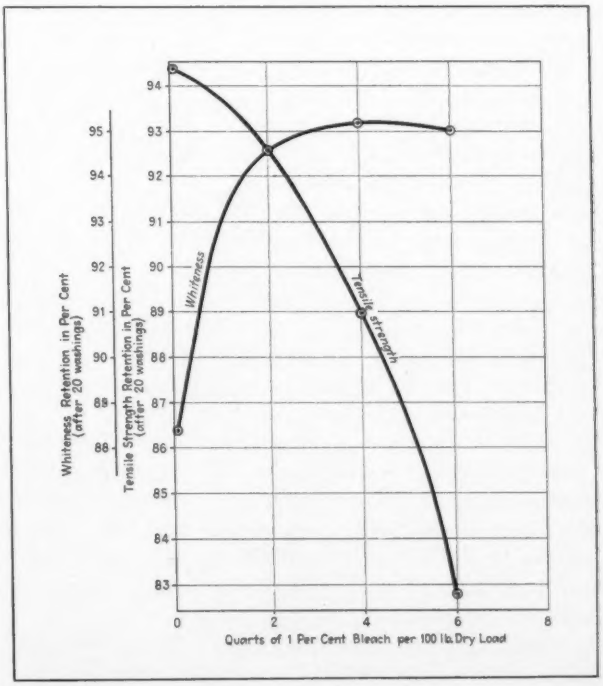

*Figure 3 in original report.

tion. To obtain this control strict attention must be given (1) to the strength of the bleach solution and (2) to the quantity of this solution used, which, in turn, should be determined by the weight of the load in the washer. It is obvious, then, that proper control of the bleaching operation can be obtained in a practical way only when the bleach supply has the same strength at all times. Until now sufficient experimental evidence has been lacking to determine definitely to what extent the use of bleach is essential to good washing and how much bleach should be used to secure maximum whiteness retention with a minimum tensile strength loss. It may be noted here that the L.N.A. has for years recommended the use of 2 quarts of 1% bleach for each 100 pounds dry weight of load in the washer.

It was for the purpose of obtaining a more definite answer to these questions that the Mathieson Alkali Works, manufacturers of HTH bleach, established Research Fellowship No. 5 at the American Institute of Laundering. The results of the investigation conducted under this Fellowship lead to the general conclusions just given. In the course of the work at Joliet a number of illuminating observations pertaining to bleaching were made. The results of the investigation were reported in detail.

Summary

The two curves in Figure 1 present a graphical summary of the results obtained from this investigation. The points through which these curves are drawn are the average values for both whiteness retention and tensile strength retention exhibited by the 9 cotton fabrics that were used. Since differences in physical characteristics of the test fabrics caused wide variations in their performance under similar washing conditions, these fabrics could be considered as representing an average load of white cotton work in an average commercial laundry.

These curves tell the entire story at a glance. After this "average load" has been subjected to 20 washings, using the formula without the addition of bleach, it has retained 94.3% of the pre-laundered tensile strength. This low tensile strength loss has been attained at a considerable sacrifice in whiteness retention. It is now only 88.4% as white as the average of the original test fabrics.

An "average load" is now washed in the same way but, in addition, 2 quarts of a 1.0% bleach solution for each 100 pounds dry weight of load is added to the last suds. After 20 such washings, the whiteness retention has jumped to 94.6%. This is more than a 6-point increase in whiteness over that obtained (88.4%) when no bleach is used. When it is realized that the eye usually can detect by comparison a difference of 2 points of whiteness, the extent to which whiteness has now been improved can readily be appreciated. Furthermore, this improvement has been attained with a negligible increase in tensile strength loss amounting to only 1.7%.

Bleach is, therefore, a definite aid in the laundering of white cotton fabrics. When, however, it is used in excess of 2 quarts of 1% solution per 100 pounds of dry weight in the load, it becomes detrimental to the tensile strength of the fabrics. This is shown by the effect on the "average load" when the use of bleach is increased to 4 quarts and then to 6 quarts for each 100 pounds of dry load in the washer. The whiteness retention has been but slightly improved, amounting to an increase of about one-half of one per cent over that attained by the use of 2 quarts. Such a slight improvement cannot begin to compensate for the increases in tensile strength loss that these additional amounts of bleach have caused. The addition of 4 quarts has reduced the tensile strength retention to 88.9% and through the use of 6 quarts it has slumped to 82.8% of the pre-laundered tensile strength of this hypothetical "average load."

In its true significance this report forcibly points to the futility, certainly the impracticability, of attempting to wash a load white and the dangers attending any attempt to bleach it clean.

● NEW JACQUES WOLF PRODUCT

Jacques Wolf & Co. recently placed on the market a one-bath water repellent, called Waterproof W-559. This product, which is the result of a long research carried on by its development department, is said to give the dyer and finisher of yarns, hosiery and piece goods a simple process for

1. Spotproofing.
2. Rainproofing.
3. Splashproofing.
4. Showerproofing.

Wolf's Waterproof W-559 makes a milky emulsion which is said to give exceptional results on all fibers,—cotton, wool, silk or rayon.

By a slight adjustment of concentration all fabrics can be made water shedding or completely water repellent.

The sales-service department is in a position to offer advice on specific waterproofing problems, and free working samples with exact directions are available.

Penetrator W-500 for the acid dyebath for woolen dyeing, and Solvent W-505 as a wool scouring additive, and Benssapol for wool scouring, are also made by this company.

● NEW SECRETARY

The International Silk Guild announced recently that Miss Ethel Herrell has been elected Secretary of the organization, to succeed Douglas Walker, who tendered his resignation at the last board meeting.

Miss Herrell, who is well known in the organization and publicity field both here and in Chicago, has been associated with the International Silk Guild since May as administrative assistant to R. D. Jenkins, vice-president.

Miss Herrell directed the campaign which raised a million and a quarter dollars for the French Hospital.

ABSORPTION OF DIRECT DYESTUFFS

(Continued from page 508)

In the case of coagulation of negatively charged hydrosols by electrolytes, the above order seems to hold good in general. It would be expected that aluminum sulfate with a trivalent cation would be more powerful than any of the mono- or divalent cations. However, in its presence, the dye solution, even at the boil, was slightly turbid, showing that an incipient coagulation, due to the formation of an insoluble salt of aluminum with the dye-acid, had already set in. It was also observed that in presence of ceric sulfate, thorium nitrate and copper sulfate, an insoluble dye salt of the metals was formed and there was practically no dyeing at all. This emphasizes the fact that when discussing the effect of polyvalent cations, their actual effect in precipitating the dye should also be taken into account.

The order of electrolytes becomes irregular at higher concentrations, some of the mono-valent salts becoming more effective than the divalent ones. This observation shows in a striking manner that generalizations as to the effect of electrolytes cannot be made from experiments carried out at one concentration only. However, this abnormal behavior can be explained on the assumption that in presence of a large amount of an added electrolyte, the solubility of the dye will be greatly decreased and, even at the boil, the precipitated salt may not be fully peptized. The degree of peptization will depend upon the relative solubility of the dye-salt formed in presence of the added electrolyte. It is quite possible that the solubility of the dye-salt in presence of the excess of electrolytes in solution is not related to the nature of the cation.

The effects of potassium di-hydrogen phosphate and di-sodium hydrogen phosphate on the amount of the dye taken up are widely different. At all equivalent concentrations, the dye absorbed in presence of the potassium salt is twice the amount taken up in the presence of the sodium salt. It would be expected that an acidic salt would cause a greater absorption than an alkaline one, on account of the destabilizing effect of the hydrogen ions and the stabilizing influence of the hydroxyl ions.

It is previously stated that protective colloids decrease the absorption of the dyes on account of their stabilizing effect. In agreement with this statement, it is found by the author that the absorption of Sky-Blue FF decreases by 10%, 21% and 10.0% in presence of small amounts of Peregal O, sodium oleate and gelatin, respectively. In presence of 3.0 gms./liter of gelatin the absorption of Benzo-purpurin 4B decreases by 45%. The greater effect of gelatin in the case of Benzo-purpurin 4B is due to its greater colloidality. It was also found that in presence of small amounts of caustic soda, the absorption decreases appreciably. All these experimental facts point invariably to the fact that the aggregation of the dye micelles is the predominant factor which controls the absorption of substantive dyestuffs. In conjunction with the considerations of the colloidal aspects of the dyestuffs, it may be mentioned here that a slightly dispersed dye would possess no dyeing property unless its dye micelles are increased to a minimum size by the addition of some reagent which would bring about destabilization. It was found by Neale and his co-workers that a chemically pure Sky-Blue FF did not dye at all in the absence of an electrolyte.

Heat has a peptizing influence on the dye colloid and therefore, according to the colloidal theory, it would be expected that rise of the temperature of dyeing would decrease absorption. Garvie, Griffiths and Neale (Trans. Faraday Soc. *30*, 271, 1934) have found that more dye is absorbed at a lower temperature. The work carried out by the author is in agreement with the results obtained by them. Here the stability of the dye solution is increased by the influence of heat. The effect of increasing the concentration of the dye brings about a decrease of the stability of the dye micelles and thus helps in increasing the absorption by cellulose materials. It was found by the author that when the concentration of Benzo-purpurin was .05 g/l, the equilibrium absorption at 90° C. in presence of .0855 N. sodium chloride was 3.30%, whereas when its concentration was increased ten times, its equilibrium absorption increased to 7.0%. It should be mentioned here that if increased absorption is required, it is always better to add a greater amount of either the sulfate or the chloride of sodium than obtaining the same result by the increase of the concentration of the dye. However, it should be remembered that if increased absorption is brought about by the latter method, the dye becomes faster to washing than if the same is achieved by the addition of a greater salt concentration.

From the foregoing it will be clear that the stability of the dye solutions is greatly helpful in explaining the absorption of the substantive dyestuffs by cellulose. A cellulose fiber consists of bundles of chains of cellulose molecules called the "micelles." In the aqueous solution, it swells and the intermicellar spaces increase. During the process of dyeing, the dye micelles diffuse slowly into these spaces and by the process of coagulation are attached to the fiber. The extent of absorption is dependent upon the relative size of the particles and the distance between the cellulose micelles. The fastness of the dyed material to washing and to other processes depends upon the force with which the dye micelles are held by the absorbent. This adhesive force has not been clearly understood as yet, but its presence is evident from the fact that the fastness under different conditions of treatment depends upon the nature of the dyestuffs.

No attempt is made here to apply the colloidal theory of dyeing to any other class of dyestuffs or to any animal fibers, which are quite different in their properties from cellulose. It is fully realized that the many factors which are concerned with the dyeing of cellulose fibers are mainly colloidal in nature and therefore it is contended that and theory which is advocated to explain the phenomena

of dyeing ought to take into account the colloidal properties of the dyestuffs and the effect of the addition of various substances on their aqueous solutions.

● A QUARTER CENTURY OF SOAP

In the last twenty-five years many changes have occurred in the textile industry—new processes, new machinery, even a new fiber. Laurel Soap Manufacturing Company, Inc., of Philadelphia, whose own beginning dates just a quarter of a century ago, has, in consequence, kept pace with these changes. In September, 1909, William H. Bertolet began in one room at Front and Laurel Streets to make a fine pure olive oil soap use in the textile field for degumming or boiling-off silk, throwing silk yarn, and scouring worsted yarn and piece goods.

To this soap were added other products used in the treatment of textiles and in a year the new company had to double its floor space. In the years that followed the increased demand for Laurel products made it imperative from time to time for the company to obtain larger quarters and in 1927 the company erected a modern building with 60,000 square feet floor of space on a two-acre lot at Tioga, Thompson and Almond Streets in that city, and a railroad sliding to facilitate shipments not only of the raw stocks in cars and tank cars, but deliveries to customers.

The new plant is equipped with modern machinery and a laboratory with competent chemists in charge. Here are tested the raw materials which are used in the preparation of Laurel products and where new products are developed to meet the requirements of the industry. One of the most recent developments of this laboratory is the new direct knitting formula, which eliminates the expensive backwinding operation in the manufacture of silk hosiery.

The business has been built on a foundation of uniform purity in the products manufactured and thorough knowledge of the requirements of the industry plus the ability and willingness to serve. Their line includes a product to fit every need for scouring and processing wool, silk, cotton and rayon.

Their products have an international acceptance. The company has direct representatives in contact with the trade in New England, Middle and South Atlantic States with warehouse facilities in Paterson, N. J., in Charlotte, N. C., and in Chattanooga, Tenn. Shipments are made regularly to the textile districts of this and foreign countries.

Laurel Soap Manufacturing Company was incorporated in 1918. The business is operated by the original incorporators under Wm. H. Bertolet, president, who is looking forward confidently to the developments of the next quarter century.

● DIVISIONS OF AMERICAN CYANAMID

H. L. Derby, President of American Cyanamid & Chemical Corporation, announces that, for the purpose of effecting closer coordination of their activities, the businesses of the following companies in the American Cyanamid group will be merged with, consolidated into and operated as divisions of American Cyanamid & Chemical Corporation:

American Cyanamid Sales Company.
American Powder Company.
Catalytic Process Corporation.
Fumigation Service, Incorporated.
Fumigators Supply Company, Inc.
General Explosives Corporation.
Gypsteel Construction Company, Inc.
Maryland Chemical Company, Inc.
Owl Fumigation Corporation.
The Selden Company.
The Selden Research & Engineering Corporation.
Structural Gypsum Corporation.

● GENERAL RELEASES

The General Dyestuff Corporation has released the following sample cards which are available upon request:

Vat Dyes Printed on Cotton Piece Goods—illustrates a complete line of vat dyestuffs, including the Suprafix types which are recommended for printing purposes. Printing recipes and fastness tables are included.

Monochrome Olive FBL—a new chrome color manufactured by I.G. which is principally recommended by the manufacturer for dyeing according to the monochrome method, but may also be chrometopped. It produces bluish shades of olive which are said to have very good fastness to light, washing, water, salt water and perspiration. The fastness to milling and carbonizing is also said to be good and to hot pressing and decatizing very good. It is claimed to be of good solubility and to dye level and is especially recommended by the distributors for the dyeing of combination shades on loose wool and slubbing, all kinds of woolen and worsted yarn and piece goods.

Brilliant Sky Blue 8GA Extra and Brilliant Sky Blue RA—which are identical with the previous imported brands. These very bright blues are recommended by the distributors for the dyeing of cotton, rayon and silk from an acetic acid bath. No fastness properties are claimed for these products.

Technical Notes From Foreign Sources

Madagascar Gum

TIBA 9,863 (1931)—In the strict sense this paper is propaganda, published by the firm which markets the product; but a paper of really scientific nature, giving the properties, and methods of use, of the newly introduced product.

Madagascar gum has been on the market only since 1929, and does not seem to be well known as yet, though rapidly adopted in central and western Europe. It is an exudation from a tree, not named, widely distributed through the island of Madagascar, and widely differing in properties from gum Senegal (continental Africa) and gum Chiraz or Shiraz (India). It is easily soluble in hot or cold water, with a weak alkaline reaction and strong viscosity; the cloudiness noticeable when dissolved can easily be cleared up by addition of any of several ordinary liquid assistants, as isopropyl, butyl, and amyl alcohol, and others.

The principal advantage offered by the use of the new material is the surprisingly high viscosity of its comparatively weak solutions. Pastes of equal viscosity (determined by the viscosimeter) are obtained with the following comparative amounts of various gums already in use:—Gum Senegal, 500 g., Gum Shiraz, 250-270 g., Gum Karaya, 170-180 g., Madagascar Gum, 150 g. With so much less of the gum contained in a paste of given viscosity, it may be seen how much more penetrative the thinner paste will be.

Alkalies, cold or hot, strong or dilute, caustic or carbonate, produce a brown-orange coloration in the paste. Soap baths in the cold do not produce this color, or at most do so only slightly. The color disappears upon neutralization with acids. On addition of a little caustic soda liquor of 38° B., and warming, a slight precipitate forms. Senegal and Shiraz gums do not show these characteristics in the cold; however, on warming, gum Senegal paste becomes slightly colored with strong caustic, and likewise, when warm, gives a flocculent precipitate with sodium carbonate. Dilute acids give no reaction in the cold with Madagascar gum paste; heated with mineral acids (dilute), hydrolysis takes place, and hexoses (reducing sugars) are formed. With Fehling's solution, the gum gives no reaction before heating with mineral acids. Gum Senegal is precipitated by ethyl, isopropyl, butyl, and amyl alcohols; Madagascar gum is rendered merely slightly turbid with ethyl alcohol, and not at all with the others.

Certain metallic salts afford characteristic reactions. Those of lead produce a flocculent brownish precipitate; the acetates of chromium give no reaction hot or cold; aluminum salts produce a thickening of the solution, and finally the formation of a solid clot, which, however, redissolves upon addition of an acid. Ferric salts give a yellowish-brown, flocculent precipitate. Stannous and titanous salts precipitate the gum in an insoluble form, colored strongly orange. Of these reactions, those with aluminium, tin, and titanium are specific for Madagascar gum. Salts of bivalent metals, zinc, magnesium, barium, calcium, merely produce a slight cloudiness, which on settling leaves the solution clear, and lighter in color.

The gum in paste form can be mixed with such solvents or assistants as acetine, resorcinol, glycerol, phenol, Irgasol, pyridine, or Tetracarnite, thus making its use possible in printing with the basic colors. The paste may also be mixed with tannin without difficulties arising. Reducing agents, as bisulfite, hydrosulfite, or sulphoxylates, merely decolorize the paste, which on exposure to air merely regaining in part its original color. Its use in dyeing with colors involving the use of such reducing agents is therefore perfectly feasible.

The paste has, however, to be clarified before it can be used for light-toned work. The process of clarification is as follows: a copper mixing-kettle is charged, for example, with 15 kilos of the gum in fine powder, and 85 kilos of water, and the mixture macerated for 2 hours, then heated by indirect steam during 3 hours to 60°-80° C., the stirrer going all the time. After the beginning of the heating, 1 kilo of terebinthine or butyl alcohol, etc., is added. The resulting paste is brownish-olive in color, and turbid. To it is added ¼ to ½ g. of caustic liquor of 38° B., and the mixture warmed for ½ hour further, then ½ g. of pyridine or decaline is added, the mixture sieved, and then centrifuged once or twice at 6000 r.p.m., best through a bag prepared with a layer of precipitated aluminium hydroxide.

For use in producing extremely delicate tints, the paste must be actually decolorized, which is possible in more than one way; by the action of reducing agents, by mechanical clarification (aluminium hydroxide, boneblack, chalk, etc.,) by precipitation by suitable means not specified. According to the nature of the printing to be carried out (class of dyestuff, nature of assistants to be used or which can be used, etc.) a perfectly clear, colorless, viscous, thin, penetrative paste can be prepared, superior to any printing pastes yet employed industrially.

It should be added that the gum in question occurs commercially in various grades as with the other gums, some selected, which are of course more expensive, but which are so clear that they yield an essentially non-turbid, non-colored paste at once, requiring only a mere straining to be ready for use.

Non-Inflammable Solvents

Tinctoria 33,239 (1933)—A long paper, covering the whole subject of the halogenated hydrocarbons; a lengthy review of the topic, general, yet full of detailed information, and interestingly written.

Acetate-Silk Dyeings with Vat Dyestuffs

German Patent No. 465,971 (28/IX/'28) (*addition to G. P. No.* 418,487 *of* 9/IX/'22)—*Durand and Huguenin S. A. in Basel*—German Patent No. 433,146 covers a method of applying vat dyestuffs to other fibers, which is not applicable to acetate silk, as the resistant properties of this fiber prevent sufficient penetration before the dyestuff is developed. The present patent extends the method of the original patent, No. 418,487, to acetate silk. The first example given will serve to illustrate the method; the goods are treated (padded) with a solution of 50 parts of the ester salt of tetrabromindigo in 685 parts of water, 250 parts of gum tragacanth, and 15 parts of sodium nitrite. The goods are then dried, steamed for 10-15 minutes, and developed at 80° C. in the usual sulfuric acid bath; then rinsed thoroughly, soaped for one minute at 30° C., rinsed, and dried. The dyeing is bright and strong, indicating perfect penetration of the goods.

Mixed Dyeings on Vegetable Fibers (Sulfur and Ice Colors)

German Patent No. 462,893 (19/*VII*/'28)—*I. G. Farben-Ind. A. G.*—The point of the process here specified consists in impregnating the goods with the reduced sulfur dyestuff liquor, and developing the sulfur dyestuff on the fiber by producing the coupling of the azo dyestuff, the diazo group of one of the azo components apparently bringing about the developing of the sulfur color as the azo components couple. The exact course of the reaction involved is none too clear as to its mechanism. In one of the four examples, diacet-aceto-o-toluidine is mixed with caustic liquor, Turkey-red oil, and boiling water, the green sulfur dyestuff employed is dissolved in sodium sulfide solution and added to the solution of the first azo-component, the goods entered and treated at 50° C. for ½ to ¾ hours, then squeezed and developed with a diazo-solution of 2-5-dichloraniline plus acetic acid.

Dyeing of Acetate Silks

German Patent No. 462,286 (7/*VII*/'28) (*addition to G. P. No.* 433,236 *of* 27/*VI*/'24)—*I. G. Farben-Ind. A. G.*—The original patent covers the dyeing of silks of the ester or ether type by means of the o-sulfonic acids of alpha-amino-anthraquinone or its substitution products. The present addition involves the similar use of the o-sulfonic acids of beta-amino-anthraquinone or its derivatives. The example describes the dyeing as merely treating the fiber at 70° C. for ¾ hour, in a bath containing only 2-amino-anthraquinone-3-sulfonic acid (0.6 g.) and water (1 liter), in a ratio of 1/20; no salt or other additions.

Desensitizing Dyestuffs (Photographic)

German Patent No. 468,093 (6/*XI*/'28) (*addition to G. P. No.* 396,402 *of* 5/*IX*/'22)—*I. G. Farben-Ind A. G.*—Not directly of interest in textile work, but worth noting, in view of the increasing employment of photography in the textile, as indeed in all arts. Anyone who has learned the value of desensitizers in his photographic work will be interested in the further development of such agents.

The most effective (or at least the most convenient and effective) substances which possess the remarkable property of narcotizing silver bromide emulsions, so that the negative can be developed in a much brighter light than usual, are dyestuffs of the p-alkoxy-quinaldine series. They are of themselves poor dyestuffs, usually too difficulty soluble in water for convenience, (cf. the pains needed in making up a stock solution of the famous Pinacrytol Green), and sometimes also stain either the emulsion, or that and the finger-tips, badly. The present additional patent converts such dyestuffs, in the form of their chlorides, bromides, or alkyl-sulfates, into condensation-products with m-nitrobenzaldehyde, the products of reaction being more effective as desensitizers, and not more than pale yellow in color, practically not staining the emulsion or fingertips at all. They are therefore of special value for the factorial development of the modern screen colorplates, where the slightest staining of the gelatine upsets the whole color-balance.

Vat Dyestuffs (Anthraquinone Series)

German Patent No. 469,019 (3/*XII*/'28) (*addition to G. P. No.* 436,536 *of* 17/*II*/'25)—*I. G. Farben-Ind. A. G.*—The original patent describes the production of amino-anthraquinones which contain m-hydroxybenzoyl residues in hydroxyl groups also present. Such products possess excellent clearness of tone, and good affinity for vegetable fibers, but are deficient in that they dye poorly, the free hydroxyl and amino groups causing unfastness toward alkali or chlorine; and through nitro and cyanogen groups present in some of the products not being able to endure alkaline reduction in vatting (with-alteration of color). The present improvement involves the use of carboxylated, or halogenated, or anhydrized derivatives, of such meta benzoyl derivatives, in place of the m-hydroxylated compounds previously employed.

Two examples are given.

Vat Dyestuffs (Benzanthrone Series)

German Patent No. 468,957 (27/*XI*/'28)—*I. G. Farben-Ind. A. G.*—By treatment of isodibenzanthrone, in fuming sulfuric acid, with oxidizing agents, at 0°-5° C. The products are not the same as those gotten by use of merely concentrated sulfuric acid.—Three examples are given.

OPEN FORUM

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

Answers

10—We have a particularly difficult problem in holding our bleachery on a set shade or white, due partially to the standard getting soiled from handling as well as from yellowing with age.

We would like some information as to how other bleacheries hold their standard shades of white.—**M. P. C.**

Answer No. 3:—The trouble here lies entirely in the kier boil, uneven bottoming and this comes from trying to get off too cheap. To maintain a uniform shade of white, the amount of natural impurities remaining in the cloth after boiling must be kept under an extractive point, meaning matter remaining in the cloth. I know of Bleacheries that produce a uniform shade of white at all times and I know of others where it varies with almost every kier boil. If the party who asks this question will give a full detail of his kier boil, type of kier, charge (Alkali, etc.) or character of cloth boiled and full particulars, I will advise him so he will be able, I believe, to come very close to getting what he is after.—Wm. Taylor Stearns.

Unanswered Questions

14—Can you give me any information regarding what has been done in the development of ramie for use as a textile fiber? Do you think there is any market for it and for what uses is it particularly adaptable?—**R. M.**

17—We are in need of mathematical text books on problems pertaining directly to textile printing but so far have been unable to find anything on the subject. If you know of texts or problems in math. especially adapted to this field, I would more than appreciate suggestions.—**O. E. M.**

New Questions

18—We are interested in obtaining information regarding the prevention of wince marks or mill creases on worsted serges dyed by after-chrome method; weight of serges ranging from 12 to 20 ozs.

Some of the operating variables we have tried out are as follows:—Before the dyeing operation the serges have been tacked, crabbed, scoured, then crabbed again, then "set" on rolls from 10 to 24 hours. This complete operation is not now being carried out.

We have dyed pieces both tacked (face in) and untacked and in order to avoid overcrowding have dyed only two to four pieces in a six-piece dyeing kettle. We have entered the serges into water (scaife) at 90° F. and taken anywhere from 40 minutes to two hours to bring the kettle to the boil and in washing off have taken from 1½ to 2 hours to cool pieces down before removing them from the kettle. The pieces are dried immediately and do not lay around in trucks. We have varied the speed at which the pieces pass through the dyebath; we have used a flat reel and also a reel with "humps" or spreaders. We have checked the soap used in scouring and run extraction tests on pieces before and after dyeing; also boiled the pieces in ammonia solution before dyeing.

Is this fault in the serge primarily due to the quality of stock and the setting adopted during the weaving operation as the heavier the serge and the "harder" the feel, the more easier it tends to mark. Also, we have obtained marked and unmarked serges that were dyed together in the same kettle.—**A. E. P.**

NEW PATENTS

Metalliferous Azo-Dyestuffs and Process of Making Same. (Useful for making colored varnishes fast to light, having a cellulose ested or ether or an artificial or natural resin as basis.) Fritz Straub and Hans Mayer, Basel, Switzerland, assignors to Society of Chemical Industry in Basle, Basel, Switzerland, No. 1,959,844, May 22, 1934.

Dyeing Preparations and Their Conversion Into Dyestuffs. (More specifically, comprises an anti-diazo-sulfonic acid of 1-amino-4-methylamino-3-chloro-benzene and 2.3-hydroxynaphthol- (1-amino-2-methylbenzene), yielding a reddish dark blue shade; other shades obtained, according to components used, are brown, garnet, blue, etc.) Arthur Zitscher and Wilhelm Seidenfaden, Offenbach-on-the-Main, Ger., assignors to General Aniline Works, Inc., N. Y., N. Y., No. 1,959,995, May 22, 34.

● DARK ROOMS

As the result of many inquiries, Bausch & Lomb Optical Co., Rochester, New York, has prepared suggested plans for two photomicrographic dark rooms. One of these plans calls for the smallest usable space, 6 inches by 6 inches, for which any small room or closet, or even the corner of a room, may serve the purpose. The other plan is for an average size dark room, 9 inches by 12 inches.

These layouts show the suggested arrangement of sink, safelight, shelves for chemicals, plates, films, paper, table, print-washer and drain-boards. Estimated costs for carpentry, painting, plumbing and electrical wiring are made. The customary materials needed for the dark room are listed and their total cost estimated.

The plans are printed on one side of a heavy cardboard poster, 9½ inches by 13 inches, on the other side of which the rules for using the dark room are printed, with a bold caption, "Knock Before Entering."

Copies of these plans may be obtained on request.

● NEW DU PONT DYES

Three new stabilized azoic dyestuffs, to be known as Diagen Red AMX, Diagen Red AR, and Diagen Scarlet AR, have recently been perfected by the Dyestuffs Division of the du Pont Company. They are described as providing a range of brilliant reds and scarlets of excellent strength and good, all-around fastness properties; and are said to be grit-free and carefully controlled for physical properties so as to insure the best of results. The new colors are expected to find their principal use for printing large patterns economically on cotton and rayon dress goods and similar fabrics.

● NEW BOOKLET

The Philadelphia Quartz Company has recently published a booklet on some of the important uses of silicates of soda in the textile industry. Copies of this booklet are available on request.

CLASSIFIED

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

POSITION WANTED as dyer, application chemist, technical demonstrator salesman or laboratory supervisor. Ten years' experience as dyer of worsted and woolen yarns and pieces; cotton raw stock, yarns and pieces; rayon yarns and pieces; and hosiery and union fabrics. Four years' experience in laboratory of dyestuff manufacturer doing standardizing, demonstrating and application research. Looking for position offering adequate compensation and future advancement possibilities. Will go anywhere. Single. Age 35. Write Box No. 823A, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSTION WANTED—Mill chemist with twelve years experience, including several years practical experience in bleaching, dyeing and finishing of cotton, rayon wool and mixtures—knit and woven goods—wishes to change from present connection. Capable of working out economics, processes, etc. Experienced in application of all classes of colors. Write Box No. 829, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

POSITION WANTED—By Philadelphia Textile graduate 31 years old, married, protestant. Experience—At present and for past 6 years, boss dyer in large plant using wool, cotton, rayon and acetate fibers; 2 years apprentice learning wet and dry finishing; 1 year apprentice at wool sorting,—also summer work in dyestuff laboratory. Would like position with opportunity for advancement. Write Box No. 832, merican Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED—Reliable European shippers of industrial chemicals for dyers' want agent for sales in U. S. A. Reply Box No. 833, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.